ORIGINAL ARTICLES

Scientific and General

ABORTION: INEVITABLE AND INCOMPLETE*

A STUDY OF 500 CASES

JAMES W. RAVENSCROFT, M. D.
San Diego

A DISCUSSION of this subject is appropriate for these reasons:

1. Abortions are common.
2. Women die from abortions.
3. Treatment is controversial.

Abortions are not rare. They occur rather frequently in the practice of every general practitioner, as well as in that of the obstetrician, and our hospitals are seldom without them.

Dr. Taussig[1] has stated that 20 per cent to 25 per cent of pregnancies terminate in abortion. It is the greatest single factor in maternal and fetal mortality, and approximately 40 per cent of maternal deaths are due to abortion.

This presentation deals with the clinical management of incomplete and inevitable abortions. The charts of 500 consecutive cases in the San Diego County Hospital from January, 1937 to June, 1941, have been personally analyzed in an attempt to ascertain the results and the important factors of treatment. Complete abortions, therapeutic abortions, and missed abortions have been excluded from this study.

DIAGNOSIS

Correct treatment first necessitates correct diagnosis. The vast majority of these cases consulted medical care because of one or more of the following reasons:

1. Vaginal bleeding, usually associated with passage of clots.
2. Lower abdominal pain, often of crampy nature.
3. Passage of decidual tissue or a fetus.
4. Evidence of infection, such as general malaise, foul lochia, tenderness of abdomen, or chills and fever.

The above signs and symptoms, associated with a history of amenorrhea in a woman in the childbearing age, usually make the diagnosis evident. However, as these signs and symptoms are also associated with a myriad of other disturbances of the female pelvis, it is not surprising that missed diagnoses do occur. Virginia Hamilton,[2] in 1941, reported 13 per cent missed diagnoses on admission in a series of 502 cases of abortion. It is not within the scope of this paper to discuss differential diagnoses, but I do want to call to your attention that, occasionally, cases of pelvic inflammatory disease, hydatidiform mole, ectopic pregnancies, uterine polyps, ovarian cysts, fibroids, and malignancy of the cervix and corpus, masquerade as incomplete abortions. In the first 8 or 10 weeks of pregnancy the differential diagnosis is sometimes especially difficult, and it often requires a diagnostic curettage, with study of microscopic sections, to ascertain the correct diagnosis.

HISTORY

Granted a correct diagnosis, one is especially interested in ascertaining if instrumentation has occurred. This study shows that 90 cases, or 18 per cent of the patients admitted criminal interference. Some 70 per cent of such criminal abortions ran an infected course, while only 30 per cent of noncriminal cases were infected. This is important, because it is infection that accounts for most maternal mortalities in abortion. The history of previous criminal abortion is important. The author was impressed with the fact that too many women habitually have criminal abortions, until they almost die from severe infection. Also, many women deny criminal interference on admission, to confess it later in the hospital stay. It is also important to learn how many times the uterus has been invaded, as cases of repeated invasion run a more stormy course. The date of invasion is significant. If evidence of clinical infection does not manifest itself within one week, it is not likely to so do. The history of previous gonorrhea and pelvic inflammatory disease should be noted. If such history of recent infection is obtainable, the author believes that a course of sulfanilamide or sulfathiazole is justifiable before curettage, if such operative procedure is needed. Criminal abortion by medical means only does not increase the incidence of infection. The history of chills and fever classify the case as septic.

GENERAL EXAMINATION

The general appearance of the patient, the pulse rate, temperature, blood pressure, presence of jaundice, and evidence of tenderness, spasticity, or rigidity in the abdomen are very significant.

PELVIC EXAMINATION

The author has seen written on the admission record of charts, "Infected abortion; pelvic examinations deferred." Some physicians have advised that, in such cases, pelvic examination should not be done, because of the danger of spreading the infection. However, it seems to me that such procedure, done under sterile conditions, with good light and, above all, with gentleness, is invaluable, and often beneficial. Tenderness on motion of the cervix means parametritis, and that the infection has already spread beyond the limit of the uterus. This is an aid in prognosis, because it is this type of case that is most dangerous, causes the highest mortality

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rate, and which should not be curetted until infection is under control. In addition, most cases bleed freely, or go on to hemorrhage, due to decidual tissue in the cervix or lower uterine segment. In such cases the amount of bleeding can be appreciably decreased by removal of such tissue, often without anesthesia, by ovum or sponge forceps, even in the presence of infection. In most cases, such loosened decidual tissue blocks drainage from the cervix and favors the increase of infection. It is at times possible to complete abortion by this method of sponge forceps removal, or at least to establish good drainage. In 71 cases of the 500, such a procedure was done with good results. However, repeated pelvic examinations by several members of a hospital staff are to be condemned. Pelvic examination should not be abused.

LABORATORY AIDS

The presence of leucocytoses, with a shift to the left of polys, is indicative of infection. However, the white blood count is only an aid in diagnosis, and a normal count certainly should not be construed as meaning no infection. Each of the two patients in this study which died, and each of which was severely infected on admission, had respective white blood counts of only 8,050, with 73 per cent polys, and 11,700 with 86 per cent polys. The red blood count and hemoglobin determination, taken on admission, generally give a good idea of the degree of blood loss. Blood-typing should be done on all cases which may need transfusion. Neither sedimentation rates, nor cervical cultures were taken in these cases.

PERIOD OF OBSERVATION

Almost everyone agrees that active bleeding or hemorrhage demands evacuation of the contents of the uterus, even in the presence of infection. Forty-eight cases, or roughly 10 per cent in this series, had surgery within the first 24 hours after hospitalization, because of bleeding. As previously stated, most cases bleed because of decidual tissue in the cervix or uterus, which can often be removed with sponge forceps, sometimes without anesthesia. This procedure is less likely to spread infection than curettage, in infected cases. The author agrees that it is generally better to observe the patient 48 hours before surgery, if bleeding is not excessive, for the following reasons:

1. Infection may manifest itself during this time, which was not evident before.
2. A few patients will admit criminal abortion who denied it on admission.
3. Some cases will completely abort, especially cases of inevitable abortion on admission, and surgery will not be needed.
4. The period of absolute bed rest, high fluid intake, etc., improves most patients.
5. Patients who are in need of blood can be transfused.
6. The cervix in many patients further dilates, softens, and effaces, so that subsequent removal of the products of conception is easier.

At the end of 48 hours' observation, the attendant should be able to decide whether or not the abortion is complete; and he should also be able to decide an even more important factor, namely, whether or not the case is infected, and, if so, the degree of spread of the said infection.

TREATMENT

As stated previously, what constitutes proper treatment is controversial. I have just returned from the American Congress of Obstetrics and Gynecology, held in St. Louis, where I heard two interesting discussions of the proper treatment.

Dr. T. K. Brown, of St. Louis, who has written considerably on the subject, advocated active treatment; that is, intervention of the uterus in every patient, whether clean or infected, regardless of the degree of spread of said infection.

He[3] empties the uterine cavity of débris under morphine-scopolamin semimarcoses, by a Foerster's sponge forceps and with, what he terms, a uterine wiper. He then gives a low pressure, 1-1000 KMNO4 douche, at 110 to 115 degrees Fahrenheit.

Dr. James Reinberger, of Memphis, Tennessee, exemplified the other extreme; namely, medical treatment, and claimed that 97 per cent of his cases were cured by oxytoxics, blood transfusion, and sulfonimides. It[4] was necessary to curette in only 3 per cent of his cases.

I feel that Dr. Brown's régime is too radical; such intervention is sometimes dangerous. We simply have been unable to empty the uterus in 97 per cent of cases, as Dr. Reinberger did, by use of medical treatment alone. However, the author believes in a "middle-of-the-road" course between these two types of treatment, and recommends a procedure as follows:

After 48 hours' observation, in noninfected, incomplete abortion, the evacuation of the uterus by dull curettage or sponge forceps. This removes decidual tissue and blood clots, which offer a fertile culture media for growth of bacteria. After the uterus is emptied, it contracts well, diminishing blood loss and aiding drainage.

In infected cases he advises a more conservative course. Any tissue blocking drainage should be removed from the cervix. The patient should be kept at absolute bed rest, given an adequate amount of fluids, and oxytoxics, such as small doses of pituitrin and ergonovine. Blood transfusions should be given, if needed, either to restore blood loss, or to increase resistance. Sulfanilamide or sulfathiazole is invaluable. The uterus can be emptied with either sponge forceps or by dull curettage, after the patient is fever-free for 3 to 4 days. The following charts show the method of treatment, with the number of hospital days, of the cases in this series. Thirty per cent were treated medically, 26 per cent treated with

sponge forceps; curettage was done in 44 per cent of the cases.

An analysis of cases is presented in Tables 1, 2, and 3.

TABLE 1.—*Incidence of Infection and Criminal Interference*

	Criminal	Noncriminal	Total
Infected	64	113	177
Noninfected	26	297	323

TABLE 2.—*Method of Treatment of Cases*

	Infected	Noninfected	Total
Medical	64	87	151 cases (30%)
Sponge Forceps	50	82	132 cases (26%)
Curette	63	154	217 cases (44%)
Total	177	323	500 cases (100%)

TABLE 3.—*Hospital Days in Relation to Method of Treatment*

	Infected	Noninfected
Medical	8.4 days	6 days
Sponge Forceps	9.8 days	6.6 days
Curette	8.1 days	5.9 days

In 15 cases receiving conservative care only, the patient had to return for subsequent curettage; and in 3 cases the patient returned for curettage, after sponge forceps only. In 6 cases a second curettage was needed.

FLARE-UP AFTER SURGICAL TREATMENT

Every patient who received either sponge forceps or curettage, and who had a fever of 101 degrees following surgery, excluding the day of surgery, was restudied. In 25 cases, or 7 per cent of surgically-treated patients, such a flare-up occurred. Nine of these cases had sponge forceps, and 16 had curettage. However, only 5 of the 25 cases having postoperative reaction had had sulfonimides before surgery. All of these patients recovered. Half of the cases which flared up were subjected to surgery in less than 24 hours after admission. However, it should be noted that it is not unusual for such flare-ups of fever to occur immediately after spontaneous passage of placental tissue or fetus. In such cases the temperature usually subsides within 2 to 3 days.

BLOOD TRANSFUSIONS

Blood transfusions were used in 112 cases, and some patients were transfused as many as 5 times. Whole blood is very valuable, as it not only restores blood loss, but increases the resistance of the patient to overcome her infection.

SULFONIMIDES

Either sulfathiazole or sulfanilamide was used in 118 of the 177 infected cases. The author believes that the administration of these drugs is invaluable in such infected cases. Cases receiving such treatment should, of course, have a re-check white blood count to determine developing leucopenia. The drugs should be stopped upon the appearance of severe toxic manifestations. Occasionally their administration causes a fever which confuses the attendant. Of the two patients, which died, one received sulfanilamide for only 3 days, starting on the 5th hospital day; and the other received a total of 15 injections of Prontosil. Both these patients were extremely septic, and the drugs did not influence the patients' down-hill course.

REPORT OF CASES

CASE 1.—E. K., a white married female, age 28, Para. 11 Gr. IV, complained of general malaise, nausea, and vomiting, and vaginal bleeding 24 hours prior to admission. She passed clots, but no known tissue prior to admission. Denied criminal abortion. On admission, the uterus was enlarged, boggy and tender, and there were parametritis, spasticity of the lower abdomen, and jaundice. Laboratory Work: Icterus index 22; red blood count 1,720,000; hemoglobin 35 per cent; white blood count 11,700; with 86 per cent polys. The patient passed a small piece of tissue on admission, which showed inflammatory exudate, and necrotic tissue which could not be identified. The patient ran a temperature of 99 degrees to 101 degrees, and in spite of four blood transfusions, developed progressive weakness, vomiting, abdominal distention, foul lochia, and cyanosis. Sulfanilamide was administered for 3 days prior to death, which occurred on the 8th hospital day.

* * *

CASE 2.—L. R., a 21-year-old married woman, para. 0, Gr. 1, pregnant 4 months. Criminal abortion by abortionist. Had fever of 104 degrees, chills, rigid abdomen, and sepsis prior to admission. History of gonorrhea, with removal of right tubo-ovarian mass, a few months previously. Patient had sponge forceps removal of products of conception on 2nd hospital day. This was done without anesthesia, and cervix was widely dilated. About 5 gm. of placental tissue, removed, showed necrosis. Red blood count 3,874,000; hemoglobin 64 per cent; white blood count 8,050, with 73 per cent polys. Three blood cultures positive for staphylococcus aureus. Patient ran a temperature of 103 to 105 degrees, and had chills in the hospital. Death occurred, on the 9th hospital day, of peritonitis, sepsis and bronchopneumonia. Prontosil was given from the 3rd to 6th hospital days, a total of 75 c.c., without benefit.

CONCLUSIONS

1. Five hundred cases of incomplete or inevitable abortions were studied.
2. Ninety cases, or 18 per cent, admitted criminal interference.
3. Seventy per cent of criminal cases ran an infected course, while only 30 per cent of noncriminal cases were infected.
4. Two patients, severely infected on admission, died—a mortality of 0.4 per cent.
5. The author advises:
   a. A complete history and examination on admission, including a sterile pelvic examination.
   b. Speculum examination and removal of loosened decidual tissue from the cervix on admission, to establish surgical drainage, and to decrease blood loss.
   c. A 48-hour observation period, unless bleeding demands intervention.
   d. Early evacuation of noninfected, incomplete cases, with sponge forceps or dull curette.

e. Conservative treatment with oxytoxics of infected incomplete cases until the temperature is normal for 3 to 4 days, before surgical intervention.
f. Generous use of blood transfusions.
g. Administration of sulfanilamide or sulfathiazole to infected cases, especially before surgical intervention.

1003 Medico-Dental Building.

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FOREIGN BODY LOCALIZATION BY X-RAY*

EARL R. MILLER, M. D.
San Francisco

THE purpose of this paper is to review methods of foreign-body localization by x-ray that can be used by the civilian radiologist in his own office or hospital on standard equipment. It is necessary that civilian radiologists become familiar with at least one simple rapid fluoroscopic method by which foreign bodies can be localized, because we all are going to be confronted with the necessitv of helping the surgeon find and remove these bodies from civilians if a continental bombing should occur; or from evacuees from the Far Eastern scene, when they are returned for base hospital care.

If there is no hurry, films taken at right angles through a part, shown to contain a foreign body by fluoroscopic survey, is still an excellent method of localization. One not only demonstrates the type, number, and shape of the foreign particles, but one has a record of their position relative to anatomical structures, and a record of other injuries such as fractures.

However, if the number of patients is great, there will not be time for this method. Fluoroscopic localization will have to be relied upon. It is the only method acceptable to the army in emergency stations.

Time does not permit even a hasty review of the many papers written on this subject. Reid and Black, in *Radiology,* in November, 1938, listed and discussed 147 papers on foreign-body localization and added a new method. Since that time several other methods have been described. Major de Lorimer, in *Radiology,* April, 1941, described the method used by the Army. For those interested, these papers are recommended for survey.

PROCEDURES

For your own office, however, you will find some difficulty in applying the described methods, unless you are willing to change the design of your machine. But several things can be done to help this situation.

The requirements are that the number, type, shape and position of foreign bodies be stated concisely. The position is usually given as the depth of a particle beneath a mark on the skin directly over the foreign body, or a mark is placed on the skin over the foreign body and its depth marked on the side of the patient.

Subcutaneous foreign bodies can be localized rather simply if one will make a metal-tipped exploring rod and determine the movability of foreign bodies by pressure on the skin over them. If such are found, their position should then be marked, and they should be labeled as subcutaneous.

For *localization of deep foreign bodies,* parallax can be used. To demonstrate the method, make a V (for victory) of the index and middle fingers of your left hand. Hold the hand about a foot from your face, so you look through the V. Put the tip of your right index finger half-way between your eye and the top of the V. Now, move your head from side to side. The index finger seems to move relative to the V. Now put the tip of your right index finger directly between the tips of the V, and move your head from side to side. Now the three fingers do not move relative to each other. The metal-tipped rod can be used beside the patient at the level of the foreign body as a parallax indicator. The screen and tube are moved back and forth. When the foreign body and the rod tip move the same amount, regardless of the tube shift, they are at the same level. In practice, a mark is placed on the skin over the image of the foreign body as seen through a very small shutter-opening, and a mark is placed on the side of the patient at the position of the rod tip. (See page 226, Army Manual.) There are special devices described, using the parallax principle. Some have rather elaborate, but simply-used scales to help determine the position of the foreign body in centimeters or inches from the front and back surfaces of the body, as well as marking its depth on the side of the patient. See Fig. 1.

DESCRIPTION OF APPARATUS

To simplify the explanation of the following methods, we will name a few parts of the apparatus. See Fig. 2. The rod connecting the tube carriage with the upright to the fluoroscopic screen is called the tube-carriage rod. A hand operated screw clamp which, when tightened, holds the tube and screen immovable relative to the table, is called the tube clamp.

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From the University of California Hospital.